DOCUMENT RESUME

ED 340 612 SE 052 554

AUTHOR Bettencourt, Antonio; Petrosini, Michael
TITLE The Documenter and the Documented Look at Change through Documentation.
SPONS AGENCY Martha Holden Jennings Foundation, Cleveland, Ohio.; Michigan State Univ., East Lansing. Inst. for Research on Teaching.; National Science Foundation, Washington, D.C.
PUB DATE Apr 91
NOTE 11p.; Paper presented at the Annual Meeting of the National Association for Research in Science Teaching (Lake Geneva, WI, April 7-10, 1991). Support also received from the Toledo Community Foundation.
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Communications; *Documentation; Educational Improvement; *Inservice Teacher Education; Junior High Schools; Mathematics Education; Program Descriptions; *Role Models; Science Activities; *Science Education; *Teaching Methods
IDENTIFIERS Holmes Group Report

ABSTRACT

This paper focuses on the question of documentation of the Science and Mathematics Support Teacher Program. A brief historical outline of the program serves to introduce the main sections of the paper where the documentation is described in its goals, activities, and results. This description is made from the points of view of a university researcher and a support teacher. The paper concludes with the importance of documenting both results and processes as well as non-intended outcomes and difficulties. The crucial importance of interpreting the collected documents as the very essence of any documentation effort closes the reflection. (Author)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED340612

THE DOCUMENTER AND THE DOCUMENTED LOOK AT CHANGE THROUGH DOCUMENTATION

Antonio Bettencourt

Institute for Research on Teaching
Michigan State University
East Lansing, MI 48824-1034
Email: 21600AB@MSU.BITNET

and

Michael Petrosini

McTigue Junior High School
5700 Hill Av.
Toledo, OH 43615-4395

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☒ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Antonio Bettencourt

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

Paper presented at the Annual Meeting of the National Association for Research in Science Teaching, Lake Geneva, WI, April 7-10, 1991. The research presented has been supported by the Institute for Research on Teaching and grants from the National Science Foundation, the Martha Holden Jennings, and the Toledo Community Foundation. We also acknowledge the cooperation of the American Federation of Teachers, the Toledo Public Schools, and the College of Education at Michigan State University. The opinions, findings and recommendations expressed in this paper do not necessarily reflect the position, policy, or endorsement of any of the organizations referred above.

RSS 050 35

BEST COPY AVAILABLE

THE DOCUMENTER AND THE DOCUMENTED LOOK AT CHANGE THROUGH DOCUMENTATION

Antonio Bettencourt

and

Michael Petrosini

Abstract

This paper focuses on the question of documentation of the Science and Mathematics Support Teacher Program. A brief historical outline of the Program serves to introduce the main sections of the paper where the documentation is described in its goals, activities and results. This description is made from the points of view of a university researcher and a support teacher. The paper concludes with the importance of documenting both results and processes as well as non-intended outcomes and difficulties. The crucial importance of interpreting the collected documents as the very essence of any documentation effort closes the reflection.

I. THE SCIENCE AND MATHEMATICS SUPPORT TEACHER PROGRAM

The Science and Mathematics Support Teacher Program is part of the many efforts at school reform and restructuring in the U. S.. Recent reports on the state of American schools have pointed out a recurrent problem: the low level of student understanding of science and mathematics. Some of these reports suggested that part of the solution comes from better prepared, supported, and appreciated teachers (Carnegie Forum, 1986; Holmes Group, 1986). One of the ways of improving the teaching and learning of science and mathematics in U. S. schools seems to be helping teachers broaden their vision of teaching and learning, update their knowledge and skills, both in content and pedagogy, and introduce instruction as an important part of the conversation among teachers (Bettencourt & Gallagher, 1989, 1990; Gallagher, 1989).

The concept of Support Teacher was developed to become the center of school based efforts at restructuring the teaching and learning of science and mathematics. The initial outline came from the ideas of "master teacher" and "lead teacher" contained in the Carnegie and Holmes Group reports (1986). Three aspects were considered essential:

Centering the role and activities of the Support Teachers on the teaching and learning of science and mathematics;

Improving the practices of science and mathematics teachers by fostering and supporting change within a school based system;

Using the most recent contributions of research on teaching of science and mathematics to provide direction to the intended changes.

The program was implemented as a collaborative endeavor of the Institute for Research on Teaching at Michigan State University, the American Federation of Teachers, and the Toledo School District. Four junior high schools agreed to participate in a

piloting phase. In these schools the science and mathematics faculties each chose one of their members to be the respective Support Teachers. The group of eight teachers (one science teacher and one mathematics teacher in each of the participating schools) attended a two day seminar each month in order to prepare themselves for their new role. The training was developed around the knowledge and skills necessary to the accomplishment of four different clusters of activities:

> Change the teaching-learning processes in the Support Teachers own classrooms;
>
> Induce and support the changes in other teachers classes by the use of observation and feedback;
>
> Disseminate new ideas, concepts and strategies in departmental meetings and informal conversations;
>
> Study research reports, conceptual articles, and practitioner oriented articles to maintain the role focused on substantive issues of teaching and learning science and mathematics.

The training seminars started in February 1988 and in September of the same year the eight Support Teacher started their new roles in the schools. The program is now in its third year of implementation. Many things happened, many changes occurred, many hurdles had to be overcome(1). These are the events that documentation tries to trace and reflect. The rest of this paper will focus on the problems, goals, activities and results of that documentation.

II. DOCUMENTING A RESEARCH INTERVENTION PROGRAM

The word 'documentation' usually refers to the collection or supplying of 'documents', that is, pieces of information that are storable and retrievable in some system and are traces left by events of interest. The Latin word *documentum* from the same root as *docere* (to teach) meant originally 'lesson', 'example', 'warning' (Morris, 1980, p. 387). The recovery of these older meanings is important to understand the functions and usefulness of documentation in a research and intervention program like the Science and Mathematics Support Teacher Program.

The Support Teacher Program had a dual nature, from the beginning. The Program aimed at changing the ways in which science (and mathematics) teaching and learning occurred. At the same time we wanted to understand both the processes of change and its results. This dual nature of the program gave the process of documentation two sets of purposes: to document the results of the program as evidence for change in a given direction and to document the processes by which these results came about. For lack of better terms lets call the first set the 'assessment component' and the second set the 'history component'. These two components are always intertwined and are not always nor necessarily separable.

Another important characteristic of the project was its collaborative nature. The project was not only based on an institutional collaboration between university, teacher's union, and local school district but also assumed and sought the participation and

---

(1) A more detailed history of the program and the changes occurred is given in Bettencourt and Gallagher (1989, 1990) and Gallagher (1989). The changes occurred are also highlighted in Zesaguli (1990).

collaboration of the Support Teachers and their peers at different levels of the Program. Obviously, this collaborative nature extended also to the processes of documentation. The university researchers, the Support Teachers and their peers were all in a broad sense 'documenters', that is, generators, collectors, and interpreters of traces of events that hereafter we will call 'documents'.

In order to suggest more vividly the collaborative nature of the documentation, the main section of this paper will be written in two distinct voices. One of the university researchers will describe the process of documentation from the university point of view and a support teacher will make a parallel description from the school side. The fact that both of us are science educators will make us talk only of the science side of the documentation. Most of what we will say had parallels in the mathematics side that we will not explore.

III. DOCUMENTATION IN THE SCIENCE AND MATHEMATICS SUPPORT TEACHER PROGRAM

The process of documentation of the Support Teacher Program will be described focusing in three main areas: goals, activities, and results.

Goals and Plans

As soon as the Support Teachers started their new role in the respective schools (i.e. Fall of 1988) the question of documenting what was going on in a detailed way had to be dealt with. The university group (hereafter referred to as Program Staff) started to discuss the process of documentation around an overarching question:

> Does the Support Teacher Program improve the quality of teaching and learning in science (and mathematics)?

This question was then specified, along assessment and history lines:

> How does the Support Teacher Program influence the climate of the science department?
>
> How does the character of teacher talk change as a result of the Support Teacher Program?
>
> How are Support Teachers' perceptions of teachers' role and responsibility altered by the Program?
>
> How are other teachers' perceptions of the teachers' role and responsibility altered by the Program?
>
> How are Support Teachers' and other teachers' perceptions of learning altered by the Program?
>
> How are the activities and tasks in class affected by the Support Teacher Program?
>
> How is student assessment altered?

We can see from these questions that from the beginning the assessment line and the history line were completely intertwined. Other questions were thought and some of these became important in the process of documentation:

What do we hope will change?

What do we hope will see at the end?

What can be accomplished with this level of intervention?

These questions, the discussion about them both among the Program Staff and with the Support Teachers gave an initial outline of a possible 'goal state' to be accomplished by the Program:

A different conception of their role by the teachers - plural role that encompasses student learning and motivation thus going beyond the traditional restriction to 'delivery';

A different conception of student learning that centers on deep understanding instead of memorization;

Different departmental norms that encourage experimentation of new instructional approaches;

A different emphasis in teachers' conversation - learning and instruction as central themes;

A norm of collegiality - teachers open to help and to seek help;

Use of small group instruction and other interactive strategies;

Teachers acting diagnostically - using students' prior knowledge as a basis for planning and teaching;

An increase in student achievement in science;

A more positive student attitude toward science;

Teachers seeking out learning for themselves;

Teachers acting on the belief that more students can succeed than are actually doing now;

The questions and the outline of the goal state were the basis for defining some of the areas that documentation should concentrate:

Support Teachers - changes in their own teaching
The Support Teacher role and activities;

The other science teachers - changes in the teaching of science;

The Science Department - changes in climate and discourse;

The School - impact in other subject areas

Administrators' perceptions;

Students - changes in achievement and attitude.

All these questions and areas to look at made necessary that the documentation was done with multiple types of documents and multiple sources of evidence for both the results and the processes of change. The documentation was to include interviews, questionnaires, sampling of teacher plans, worksheets, and tests, sampling of student work, records of meetings and informal contacts, etc..

Mike Petrosini:

> The documentation that has taken place can be put into several categories of study. First, we wanted to document improvement in our students' attitudes toward science. Second, we wanted to document our teachers' change from teaching in a traditional manner (facts, figures) into teaching students to learn concepts in science that could be applied to solve new problems.

Activities

The activities of documentation really began in the first training seminar with the Support Teachers held in February 1988. This and the following meetings were taped and field notes were recorded. In many of these meetings the Support Teachers wrote their impressions, their feelings, their concerns, their accomplishments, their difficulties, etc. All these 'documents' were collected. The Support Teachers were observed in their classes during the training phase and field notes of these were recorded. They videotaped some of their classes. These videotapes were collected also. The handouts given, the training manuals assembled for them, the readings used and suggested all were kept as documents in the Program files.

The meetings of the Program Staff in the University were recorded in field notes. The conversations in the car in the returning trip from Toledo were also some times tape-recorded. Memos internal to the Program Staff, memos from the Program Staff to the Support Teachers, memos and letters from the Support Teachers all were also kept.

Interviews of the Support teachers during the training phase were recorded and transcribed. Questionnaires, teaching-style inventories were also given to the Support Teachers in the first year. All these were stored in the Program files.

The Fall of 1988 marked the beginning of the Support Teachers' implementation of their role in the schools. Instead of training seminars, the Program Staff started doing 'technical assistance' (Gallagher, 1989; Science and Mathematics Support Teacher Program, 1989). Each visit to Toledo, one of the Program Staff members would go to one of the schools to work with the Support Teachers for a half a day or a day. These visits generated all kinds of documents: videotapes of classes, observations of some teacher, recording of feedback sessions, notes and audiotapes of meetings, "artifacts" (like tests, quizzes, student work, etc.), "anecdotes" (like informal conversations, narratives by the Support Teacher, some other teacher, an administrator), etc..

The activities of the Support Teachers were, however, too rich and too complex to be adequately documented by these glimpses into their daily work(2). In the months of December 1988, March 1989 and May 1989, four observers were asked to 'shadow' a pair of Support Teachers at a school for a week while they were going about doing their normal activity. The term 'shadowing' (Wolcott, 1973, p. 3) captures the essential characteristics of the activity. The observer was to follow the Support Teacher 'like a shadow' as unobtrusively as possible, record as much as possible what was going on, collecting as many artifacts as possible, nosing in the Support Teachers' files and materials, talk to other teachers, sit in meetings and feedback sessions, etc.

> A typical day of shadowing Mike Petrosini would start by Roberto dropping me at the school door around 9.00 am. I started by going to the office to tell the secretary that I was going to meet Mr. Petrosini. I would then go to his room and observe his class, taking my notes of what was going on. After the class I would either observe the next two classes or go to the Support Teachers' resource room and look at his files or into the log book. I would make lists of articles he read/distributed, look at his samples of student work, peruse his log book and make notes of these things. Some more interesting pieces I asked him to xerox for the Program files. We would then go to lunch (He always made a point of paying my lunch) with the other teachers. After lunch I would follow Mike in his daily Support Teacher routine. We would go around in his daily visit to each of the science teachers. He would inquire how things were going, what happened, new things tried, need any help, etc.. If there was any meeting I would participate. If Mike was going to an observation followed by a feedback session I would observe the teacher with him, participate of the feedback session, frenetically taking notes and sometimes giving my opinion or suggestion. After the feedback I would sit down with Mike and debriefed the feedback with him. Many times we sat down in the resource room at the end of the day to have a conversation about his successes and frustrations and talked about what to do next. After he left I would write long notes about these conversations and other events of the day. At 3:00 I was very tired and welcomed Roberto's ride back to the hotel.

Mike Petrosini:

> Materials have been collected constantly by the Support Teachers in an effort to obtain data on the students, Support Teachers and the Support Teachers' peers to show progress that was being made. With regards to the students the teachers employed the use of mind stretchers, essay tests, group activities, pre- and post-writings, debates, discussions, and intense questioning methods.
>
> Files have also been kept on each of the peer teachers. In these files the Support Teachers put all the materials they were able to obtain from their peers. Materials included copies of tests, group activities, mind stretchers, quizzes, homework, and any new materials that they tried which they thought was worth improving for next year and sharing with other teachers.
>
> Teachers have also been observed in the classroom by the Support Teacher and other peer teachers. As a result of these observations the Support

(2) More detailed descriptions of the Support Teachers' daily activities can be found in Bettencourt and Gallagher (1989, p. 5; 1990, p. 25) and Gallagher (1989, p. 54).

Teachers have held both formal and informal feedback sessions with their peer teachers to discuss the classes that have been observed. During the feedback sessions the Support Teacher recorded what was taking place in class during the lesson. The observations were broken down into how the lesson was progressing, communications between student and teacher, tasks that were assigned, and the students' social behavior.

Daily logs have been kept by the Support Teachers. These logs consist of a written record of the daily activities of the Support Teacher. Items to be found in the logs are daily and weekly agendas, notes from meetings, readings, observations, feedback sessions, and any other activity involving the Support Teachers during the day.

Results

All these documents, all these data collection strategies, all these sources of evidence, all these traces of a program of research and intervention... What did we learn? We learned that documenting a process of change has to be done as the process unfolds or we will miss key turning points. Having an entry-level measure and an output measure are important things but they miss the history of the change. Having a description of the change may not be sufficient for assessment purposes. The combination of both dimensions makes the documentation sensitive to the results obtained even if they were unintended.

We also learned that change takes time. After three years of implementation the first signs of widespread change in the science classes are starting to show. The teachers had to have time to relearn the challenge of trying new things. The Support Teachers had to learn how to deal with teachers that were not receptive to change without taking it personally.

The science department climate has changed dramatically in most schools. Teacher are keen in sharing materials, in planning together, in coming up with joint projects, in visiting each others' rooms, in asking for help and giving help.

The student attitude improved in most classes as teachers made efforts to use different strategies and listened to the students more. Their achievement results are mixed as the teachers expectations and demand are higher.

We learned that a process of documentation of a Program of this nature demands careful attention to data management. As hundreds of documents pour into the files there has to be some sort of system to catalog and make accessible these pieces. Computer storage and retrieval seems to be an option. In this case a system was devised to help store, retrieve and work interactively text and sound documents (Monteiro, 1991).

Mike Petrosini:

Teachers have met constantly in both formal and informal meetings to discuss a wide range of topics. Some of these topics included topics being taught, methods of teaching, ways to improve student learning, ways to involve more students in class activity, methods of questioning students, discussions on readings, shaping new materials developed in class.

In many other cases the Support Teachers have modeled lessons for their peers. During these modeling lessons the Support Teachers gave examples of

new and innovative questioning methods, new ways to involve students in group activities, new approaches to teaching concepts and understanding.

Teachers have also in many instances worked together teaching a topic. They have sat in with the students in class and acted as another resource for the teacher teaching the class.

Support Teachers have also at their own expense attended many professional meetings, and conferences. They have also been taking part in a 3 year series of meetings and seminars conducted by the Michigan State University faculty on a regular basis in Toledo, Ohio, and East Lansing, Michigan.

We have learned much in the past three years about ourselves, students, and peers. It has been the most rewarding time in 26 years of teaching. Like so many of the countless teachers in the U.S.A. teaching has been conducted in isolation. In the past once the door was closed at the start of school little was said in a positive way among teachers. Now since the Support Teacher Program has been instituted this feeling of isolation has been shattered. Teachers and students are more motivated. Students have made progress, in their attitude toward school, understanding concepts in science, and in their social skills. My only regret is that due to funding this program may be cancelled.

IV. DOCUMENTING CHANGE AND CHANGING DOCUMENTATION

Documentation of the changes occurred in a long term intervention program has to keep in mind the two vectors of history and assessment. This means that the goals of the program orient the documentation effort in terms of looking for evidence of change in the desired direction. It also means that the documentation has to be sensitive in order to characterize in detail the processes by which the changes came about (or did not). Another dimension is to keep a detailed record of difficulties, resistance, defiance, frustrations, etc.. Still another domain is the documentation of results, effects, or events that were not intended but become a source of insight into the process and results of change.

Research, intervention, and documentation are not, and cannot be, separated processes in these kinds of Programs. They are inextricably intertwined in webs of mutual influence. The intervention is guided by the research questions, but the research, seeks to understand the intervention. Both the intervention and the research guide the documentation efforts but as the documentation starts to show anything the research and the intervention are influenced and possibly redirected or changed.

Finally, no documentation is of any use if the documents are not interpreted, connected with one another, transformed into sources of insight and understanding about the history and results of change. All the documentary evidence that is gathered in the files of a program like this has to be painstakingly sifted through and changed from a document into a 'memory', that is, something worth remembering. The ultimate goal of documentation is to transform the document (inert piece of information) into a *documentum*, i.e. a 'lesson', 'example' or 'warning'. Only that will make us "smarter about teaching and learning" as Perry Lanier likes to say. That is precisely the difficulty and the adventure of documentation.

REFERENCES

Bettencourt, A. & Gallagher, J. J. (1989, April). *Helping science teachers help science teachers: A study of change in junior high school science.* Paper presented at the annual meeting of the National Association for Research in Science Teaching, San Francisco, California. (Available from the first author: 301 Erickson Hall, Michigan State University, East Lansing, MI 48824-1034, Email: 21600AB@MSU.BITNET)

Bettencourt, A. & Gallagher, J. J. (1990 April). *Changing the conversation: When science teachers start talking about instruction...* Paper presented at the annual meeting of the National Association for Research in Science Teaching, Atlanta, Georgia. (Available from the first author: 301 Erickson Hall, Michigan State University, East Lansing, MI 48824-1034, Email: 21600AB@MSU.BITNET)

Carnegie Forum on Education and the Economy. (1986). *A nation prepared: Teachers for the 21st century.* The Report of the Task Force on Teaching as a Profession. Washington, DC: The Forum.

Gallagher, J. J. (1989). Research on secondary school teachers' practices, knowledge, and beliefs: A basis for restructuring. In M. L. Matyas, K. G. Tobin, & B. J. Fraser (Eds.), *Looking into windows: Qualitative research in science education.* Washington, DC: American Association for the Advancement of Science. (Available from: M. L. Matyas, AAAS, 1333 H St. NW, Washington, DC 20005)

Holmes Group. (1986). *Tomorrow's teachers: A report of the Holmes Group.* East Lansing, MI: The Holmes Group.

Monteiro, R. (1991). Using microcomputer technologies for managing interpretive research data. In J. J. Gallagher (Ed.), *Interpretive research in science education.* NARST Monograph no. 4. Washington, DC: National Association for Research in Science Teaching.

Morris, W. (Ed.) (1980). *The American heritage dictionary of the English language.* New college edition. Boston: Houghton Mifflin Company.

Science and Mathematics Support Teacher Program. (1989). *A new professional role for science and mathematics teachers: A proposal submitted to Toledo Community Foundation by The College of Education, Michigan State University on behalf of American Federation of Teachers, Toledo Federation of Teachers, Toledo Public Schools and College of Education - Michigan State University.* East Lansing, MI: College of Education, Michigan State University.

Wolcott, H. F. (1973). *The man in the principal's office.* New York: Holt, Rinehart and Winston.

Zesaguli, J. K. P. (1990). *A study of the change in the Toledo Science Support Teachers' vision, skills, and techniques, in relation to the teaching and learning of science.* Unpublished report. (Available from the author: College of Education, Michigan State University, East Lansing, MI 48824-1034)